

physical examination curve. If we must admit intellectual mediocrity, let us, at any rate, secure that we have, in compensation, physical excellence.

In practice this would necessitate the preliminary testing, when they are undergoing their medical inspection, of all candidates by means of the spirometer; neither a difficult nor a lengthy operation. No doubt, as Dr. Venn points out, breathing power may to some extent be improved by practice, and candidates would all flock to a "spirometer-crammer." But probably all of them would be the better for some physical cramming in this way.

C. LLOYD MORGAN.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—Prof. W. Watson Cheyne, F.R.S., has been appointed an additional Examiner in Surgery for the present term.

An inter-collegiate Examination in Mechanical Science and Engineering, for candidates for the Mechanical Sciences Tripos, will be held, under the direction of Prof. Ewing, at the end of this term, commencing on June 4.

THE Somerset County Education Committee have adopted a resolution in favour of establishing in the county a fixed Dairy Farm School for adults of both sexes. Instruction in cheese and butter making, and in subjects allied thereto, would be given. Provision is made for granting thirty scholarships, giving free board and tuition at the school for two months, to farmers' sons and daughters engaged in dairy work. The Committee have agreed that it is desirable to set up an agricultural side to one or more of the existing secondary schools in the county. It is hoped that in due course an agricultural college for the West of England will be provided by the combined efforts of the local counties.

WITH the view of acquainting teachers with a course of experiments in accordance with the British Association Committee's programme for the teaching of Chemistry in schools, the Evening Schools Code, and the syllabus for Major Scholarship examinations recently prepared by a committee of the Incorporated Association of Head Masters, Prof. Armstrong, F.R.S., will give a series of demonstrations at the City and Guilds Central Technical College, on Saturday mornings, in May. The special object of the course will be to explain the exact method to be followed in carrying out a carefully arranged series of very simple qualitative and quantitative experiments calculated to impress the chief and most generally useful facts of chemistry on children's minds whilst developing their powers of observing and reasoning.

It has often been urged against the educated natives of India, that they are admirable at adaptation, but are altogether at a discount where original research is concerned. The Hon. Mr. A. Cadell commented upon this failing in a recent address to Convocation of Allahabad University. His advice was that debating societies, which are so common a feature of student-life, should give place to natural history societies; the object would be to foster the true scientific spirit in the native mind. In this connection, some remarks (which we quote from the Allahabad *Morning Post*), made by Prof. Ingram, of the Madras Educational Service, indicates that the complaint as to the want of scientific research by natives of India is not without foundation. In a recent contribution he says:—"Now, if India is not helping in this work, if she is supplying no additional information, and is offering no aid towards the consummation of this unity, her claim to be regarded as in any sense a scientific country, is null and void. No matter how assiduously her students may devote themselves to studying the science course of their University curriculum; if it all end there, it is nothing. But need it end there? What country could offer greater facilities for scientific research than India? Here is a country teeming with animal and plant life; but the systematic biology of India is still in a nebulous condition. Why are no students devoting themselves to collecting and collating, and studying the plants of their districts, or the insects that abound within their walls? It would be hard, too, to find a country better suited than India, with her clear atmosphere and cloudless skies, for the study of the stars or of other atmospheric phenomena. In these ways, and in a thousand others, we might be advancing

the cause of knowledge. But we can scarcely be said to have begun yet." By way of remedy, Prof. Ingram suggests the formation of an Indian Royal Society, or some such association as would serve the same purposes here as the British Association does at home. It is possible, however, without going to that length, to utilise the resources already at hand. India is not without its scientific societies. There are the Asiatic Society of Bengal, the Indian Science Association, and the Bombay Natural History Society, all of which are amply sufficient for the purposes of scientific research.

SCIENTIFIC SERIALS.

American Journal of Science, April.—Niagara and the Great Lakes, by F. B. Taylor. By a correlation of the abandoned shore lines, moraines, and outlets, and the gorges, recently submerged shores, and rivers of this region, the author is led to the view that the lakes were at first glacial and ice-dammed, falling by stages as the outlets changed on withdrawal of the glacier-dams. By the withdrawal of the glacier the Niagara river was opened, and the upper lakes became united. The land was gradually depressed at the north, and finally led to the opening of Nipissing outlet, which was then brought down to the sea-level, and marine waters filled the three upper lakes, the Ontario, St. Lawrence, and Winnipeg basins. The subsequent raising of the Nipissing outlet made the upper lakes fresh again. Then followed the stage of the second Lake Algonquin and that of the second (present) Niagara lakes. Lake Superior became independent. The Great Champlain uplift took place at the north-east, and the formation of the St. Clair delta began, and continues to the present day.—Disturbances in the direction of the plumb-line in the Hawaiian Islands, by E. D. Preston. There appears to be a disturbance of more than a minute in the direction of gravity at the south point of Hawaii. At Kohala the plumb-line is deflected half a minute towards the south, and at Kalaieha nearly as much towards the north, the disturbance being in both cases towards the mountain. The deflection at the south point is also northward, and is caused by the great masses of Mauna Loa and Mauna Kea.—Structure and appendages of *Trinucleus*, by Charles F. Beecher. The three posterior thoracic endopodites are very similar, and in a general way closely resemble those of *Triarthrus* from the same region of the thorax. They are, however, comparatively shorter and stouter, and could not be extended beyond the ends of the pleura. The two distal joints are cylindrical, with well-marked articular surfaces and ridges. The joints preceding these proximally become much wider, flattened, and produced into transverse extensions which carry large tufts of setæ at the end. The exopodites seem to be composed of slender joints, the distal exites being long and slightly curved outwards. They carry very long, close-set, overlapping lamellose fringes, which evidently had a branchial function. The characters of the appendages indicate an animal of burrowing habit, which probably lived in the soft mud of the sea-bottom, much after the fashion of the modern *Limulus*. In addition to its limuloid form, the absence of eyes seems to favour this assumption. So does the fact that many specimens have been found preserving the cast of the alimentary canal, showing that the animal gorged itself with mud, like many other sea-bottom animals.

Wiedemann's Annalen der Physik und Chemie, No. 3.—Electric conduction and convection in feebly conducting dilute solutions, by E. Warburg. The alteration of conductivity produced by a current in bodies like aniline, the phenomena of convection exhibited by them, and their apparent deviations from Ohm's law, can all be explained on the supposition that their conductivity depends upon an electrolyte of which the body is a very dilute solution. Bodies were investigated whose conductivities went down to 5×10^{-10} . The similar behaviour of still worse conductors, like xylol, benzol, oil of turpentine, is probably due to the same cause.—Ratio of sectional contraction to longitudinal dilatation of iron rods during magnetisation, by A. Bock. By magnetisation the constants of elasticity of soft iron are altered to an extent not exceeding 0.5 per cent. The observations indicate that flexure diminishes, torsion also decreases, and the ratio of sectional contraction to longitudinal expansion increases. Iron becomes more incompressible in the magnetic field (see p. 614).—Freezing points of some binary mixtures of heteromorphous substances, by Albert Dahms. Eutectic mixtures

give no uniform crystallisation product, but always a heterogeneous mechanical mixture, consisting of solid solutions of the components in each other, and in the limiting cases of the components themselves. The composition of eutectic mixtures—i.e. those mixtures of two bodies which have the lowest fusing points—does not correspond to simple molecular proportions of the components. In eutectic mixtures the process of solidification is in general more complicated than in chemically homogeneous bodies, owing to complex supercooling. Equimolecular solutions often show approximate correspondence of fusing points, also for the higher concentrations. Menthol, $C_{10}H_{18}OH$, exists in two modifications, which explains the divergences of the freezing points of even the most dilute solutions in menthol.—On glow discharge in air, by C. A. Mebius. Straight lines representing the relation between strength of current and difference of potential for different distances between the electrodes, are not parallel, the divergence increasing with the extent to which the air has been modified by the current. The fall of potential gradually decreases with a constant or an increasing current. These changes are probably due to the formation of nitric oxide, as was proved with the spectroscope.

Bulletin de l'Académie Royale de Belgique, No. 2.—On a new class of ethers: methylene lactate, by Louis Henry. Methylene monolactate, $CH_2 \cdot CH_2 \cdot C_2H_3O_3$, obtained by heating lactic acid with polymerised methanal, is a colourless mobile liquid, with a strong odour resembling methanal, and an extremely pungent taste. Its density is 1.1974 at 2.5° C., and it boils with remarkable regularity at 153° to 154°.—Comparison of the astronomical coordinates referred to the instantaneous (astronomical) pole and the (geographical) pole of inertia respectively, by Ch. Lagrange. The discovery of the sensible character of the variations of latitude and longitude is not of such a nature as to render necessary the substitution of geographical axes to instantaneous ones in astronomy. The mean values of the latitude and the longitude will be the geographical characteristics of the spot. But for the points of the heavens, the result of the substitution of geographical for instantaneous axes would have the eminent disadvantage of affecting all their coordinates with diurnal variations 300 times greater. This is a simple geometrical consequence of the fact that every day the geographical and the instantaneous axes describe a cone about the resultant, and that the geographical cone is 300 times more open than the instantaneous cone.—Critical temperatures of mixtures and of water, by F. V. Dwelshauvers-Dery. The critical temperature of water was obtained by finding the critical temperatures of aqueous mixtures of alcohol or acetone containing more and more water. The limiting value for water, as derived from the acetone results, was 638° C., from the results with alcohol, 641° C.—Action of heat upon carbon bisulphide, by Henryk Arctowsky. Carbon sesquisulphide, CS_2 , which is obtained by exposing the bisulphide to the voltaic arc, may also be obtained by keeping it at 250° C. for some time. It is this body whose presence in small quantities in commercial CS_2 gives this product its pungent odour.

THE number of the *Journal of Botany* for April is occupied almost entirely by papers on descriptive botany, viz. on African species of *Eriosema*, on South American species of *Polygala*, on British *Rubi*, on hybrid *Epilobia*, and others on special species or genera.

The *Bulletin of the Minnesota Botanical Studies* for March contains a paper on a period of growth in the fruit of *Cucurbita Pepo*, by Mr. A. P. Anderson, accompanied by an elaborate series of tables and plates of curves. The other articles in the same number refer exclusively to the Flora of Minnesota.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, March 21.—“Experiments upon the Influence of Sensory Nerves upon Movement and Nutrition of the Limbs.” (Preliminary communication.) By Dr. F. W. Mott and Dr. C. S. Sherrington, F.R.S.

Claude Bernard first showed, by experiments upon frogs, the impairment of movement in a limb deprived of sensation by cutting the posterior spinal roots. The authors have, by an extensive and varied series of experiments on the monkey,

demonstrated the important rôle played by sensation in the performance of voluntary movements.

The experiments deal separately with the upper limb and the lower limb. The phenomena do not essentially differ, but are more striking in the former.

Summary of Experiments.—The limbs were deprived of all sensation, superficial and deep, by cutting the “whole series” of posterior spinal roots. For the upper limb, 4th cervical to 4th thoracic inclusive. For the lower limb, 2nd to 10th post-thoracic inclusive.

Animals with a limb thus deprived of all forms of sensation from the time of operation onwards, even up to four months, have never been observed to use it in any finer and delicately adjusted movements. For example: the foot is not used in climbing or grasping, nor is the hand. The animal does not use the hand to defend itself, or even to satisfy hunger, when prevented from picking up food by any other way, than by using the desensitised hand. It must be concluded, therefore, that there is *actual inability* to perform the movements in question. Occasionally in struggling, coarse movements of the shoulder and elbow take place; but, as a rule, the arm hangs down helplessly. The movements abolished are those most literally represented in the cortex cerebri. Damage to the pyramidal tract is not the cause of the loss of movement, because degeneration is not found in the spinal cords; moreover, stimulation of the cortex cerebri evokes movements in the desensitised limb even more readily than the normal.

The effect of section of the “whole series,” except the *one root* which supplies the *apex* of the limb, produces only a very slight impairment of movement. Any trophic changes that occur are due to pressure and microbial infection.

“Is Argon contained in Vegetable or Animal Substances?” By George W. MacDonald and Alex. M. Kellas.

At Prof. Ramsay’s suggestion, experiments were undertaken by the authors to see whether argon could be obtained from nitrogenous vegetables or from animal tissues.

It is concluded that there is no appreciable quantity of argon in peas (or at least that the argon cannot be obtained with the nitrogen by Dumas’ method).

An experiment with regard to the presence of argon in animal tissues was also negative in its results. Mice were selected for the experiment, because the nitrogen from the whole animal could be conveniently collected by Dumas’ method.

Chemical Society, March 21.—Dr. Armstrong, President, in the chair.—The following papers were read:—The volumetric determination of sugars by an ammoniacal cupric solution, by Z. Peske. The author has devised a modification of Pavy’s method of estimating sugars, and gives tables showing the reducing power of ammoniacal cupric solution for solutions of various sugars.—The action of hydrogen sulphide on antimonious acid solutions, by O. Bošak. The author demonstrates the existence of compounds of the composition SbX_4 ; he has obtained the tetrasulphide Sb_2S_4 , and a double compound of the composition $3KCl, 2SbCl_4$.—Action of hydrogen sulphide on antimonious, arsenic and telluric acids, by B. Brauner.—The atomic weight of tellurium, by B. Brauner. From its position in the periodic table, tellurium should have an atomic weight between 123 and 125, whilst the number actually obtained is 127.71; for this and other reasons the author concludes that tellurium is not a simple substance, although attempts to effect a separation of its constituents have failed. The author suggests that tellurium is a mixture or compound of two elements, one of which occupies the position of tellurium in the periodic table, and the other of which is the hypothetical “triargon.”—The hydrolysis of maltose by yeast, by G. H. Morris.—Studies in isomeric change. Part iv. Ethylbenzenesulphonic acids, by G. T. Moody. The sulphonation product of ethylbenzene yields only one sulphonic acid, and not two, as stated by Chrutschow. The para-acid is obtained thus: the ortho-acid can be prepared by sulphonating and subsequently reducing ethylbromobenzene. — β -Ethoxynaphthalenesulphonic acids. The arrest of isomeric change at an intermediate stage, by A. Lapworth. During the sulphonation of ethoxynaphthalene at a low temperature the 2:1-sulphonic acid is the first product. On allowing the mixture to stand, however, this spontaneously changes into the 2:1-acid.—Some oxyppyridine derivatives, by Miss A. P. Sedgwick and N. Collie. Starting from γ -chloro- $\alpha\alpha'$ -dimethylpyridine and $\alpha\gamma$ -dichloro- α' -methylpyridine, the